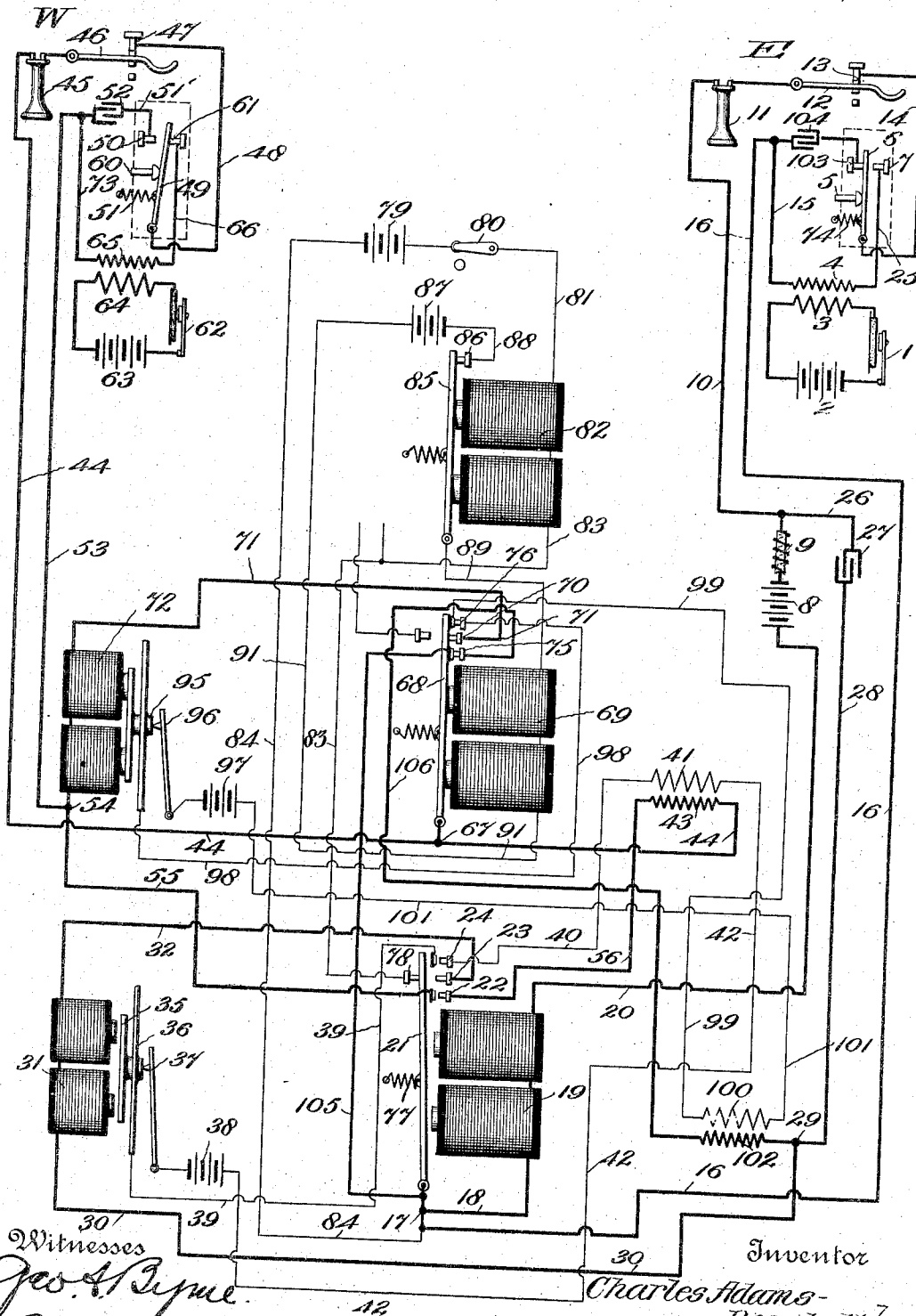


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 TELEPHONE REPEATING SYSTEM.
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TELEPHONE REPEATING SYSTEM.

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To all whom it may concern:

Be it known that I, CHARLES ADAMS-RANDALL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Telephone Repeating Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a telephone repeating system having a controlling means in a circuit independent of the main line circuits when receiving or sending; having repeater and induction coils in the main line circuits when receiving or sending; and having independent main line circuits so related to each other, that voice-caused currents transmitted over one main line, cause corresponding currents to be automatically transmitted over a second independent main line circuit through the medium of automatically operative local means.

To these ends the invention consists in the novel combinations of parts and arrangement of circuits more fully herein-after disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification, the figure is a diagrammatic view of a repeating system arranged in accordance with my invention.

Supposing E represents an eastern station and W a western station; and supposing a message is to be transmitted from the station E to the station W, the operation of my invention is as follows:—The operator pushes manually upon the button 5 at the station E, thereby closing circuit between the contact lever 6 and the contact 7, whereupon current will flow from the battery 8, through the impedance coil 9, along the main line conductor 10, through the receiver 11, the hook lever 12, which being in position to receive, closes circuit with the contact 13 and permits current to flow along the conductor 14, and to the contact lever 6. The said current now flows across the contacts 6 and 7, through the secondary 4 of an induction coil associated with the transmitter 1, thence along the conductor 15, the conductor 16, to the point 17, whence it divides and passes along the conductor 18,

through the coils of the east controller 19, along the main line conductor 20 and back to the battery 8. The current passing through the east controller 19, through the controller circuit just described, energizes said controller, and causes its armature 21 to close the contacts 22, 23 and 24. After the push button 5 has been operated in the manner above disclosed, then the operator wishing to communicate with the station W talks into the transmitter 1, which causes currents to flow from the battery 2, associated with said transmitter and through the primary coil 3 of the induction coil also associated with said transmitter. These voice-caused currents passing through the primary 3, induce currents in the secondary 4 of said induction coil, and these induced currents may be supposed to flow from one end of said secondary along the conductor 25 to and across the contacts 7 and 6, along the conductor 14, across the contacts 13 and 12, through the receiver 11, along the main line conductor 10 and to the impedance coil 9. The impedance of the coil 9 is chosen of such a value, that very little, if any of these voice-caused induced currents will flow there-through, so that the said currents pass to the conductor 26 and into the condenser 27, thereupon charging said condenser and causing similar currents to flow along the main line conductor 28 to the point 29, where the current next passes along the main line wire 30, through the coils of the east repeater 31, over the wire 32 to the contact 23 now closed, along the armature 21 to the point 17, over the wire 16, and back along the wire 15 to the other end of said secondary 4. The passage of currents in accordance with sound waves from the condenser 27, through the east repeater 31, and over the main line sending circuit just described, causes the armature 35 of said repeater, to vary the resistance between the contacts 36 and 37, and thereby correspondingly varying local currents are caused to flow from the local battery 38 across said contacts 37 and 36, along the local wire 39, across the contact 24, which is now closed, along the local wire 40, through primary 41 of the eastern induction coil, and along the wire 42 back to the battery 38.

It will be observed that so far as has now been disclosed, the coils of the eastern controller 19 are in a main line circuit governed

by the push button 5, but are not traversed to a material extent by the voice-caused currents emanating from the secondary 4 owing to the impedance 9. It will be further observed that said voice-caused currents traverse a main line sending circuit which includes no coils except those of the receiver 11 and the eastern repeater 31; and further that this main line sending circuit causes currents to be induced in the secondary 43 by means of a local circuit. It will further appear below that this eastern main line sending circuit is entirely independent of the main line western receiving circuit, except through the above inductive relation of said local circuit from the battery 38. The passage of currents from the eastern repeater 31 through the primary 41 of the eastern induction coil induces currents in the secondary 43 of said coil, which pass over the western main line receiving wire 44, through the western receiver 45, the western hook lever 46, across the contact 47 which is in electrical connection with said lever 46, over the wire 48, along the western contact lever 49, which being in position to receive is in electrical connection with the contact 50, and is held in such position by the spring 51. The relayed induced current accordingly passes from said contact 50 over the wire 51 into the condenser 52, charging the latter, and causing a similar current to flow from said condenser along the western main line wire 53 to the point 54, over the wire 55, through the contact 22 now closed as above set forth, and over the western main line wire 56 back to the secondary 43 of the eastern induction coil. The passage of these currents similar to sound waves through the receiver 45 at the western station, of course, reproduces the voice originally sent out from the transmitter 1. It will be therefore observed, as above stated, that currents corresponding to those which emanate from the eastern transmitter 1 are reproduced in the independent western main line receiving circuit and from the eastern secondary 43 of said main line; and that no coils are included except coil 43 and that of the receiver 45. It will be further observed that only one main line battery 8 is employed.

When it is desired to send messages from the western to the eastern station, the latter of course has its push button held back in its normal position through the agency of the spring 74, and therefore, the circuit from the main battery 8 through the contact 7 is broken. It results from this that the circuit through the contacts 22, 23 and 24 of the eastern controller 19 is likewise broken, since the controller 19 is inactive and that the circuit through the contact 70 of the western controller 69 and its associated contacts 75 and 76, is made by the agency now to be described. That is to say, when the

spring 77 of the eastern controller 19 restores the armature 21 to its normal position, said armature makes connection with the contact 78, thereby permitting current to flow from the local battery 79, over the switch 80, along the wire 81, through the coils of the relay 82, along the wire 83 through said contact 78, armature 21, and wire 84 back to battery 79. The passage of the current through coils 82 of the relay causes its armature 85 to close the circuit with the contact 86, whereupon current passes from the battery 87, over the wire 88, said contact 86, armature 85, wire 89, coils 69 of the western controller, wire 91, and back to battery 87. The passage of current from the said battery 87 through the coils 69 of the western controller, therefore, causes the armature 68 to make circuit with the contacts 70, 75 and 76, as above stated.

Now when it is desired to speak from the western station W to the eastern station E, the operator at W presses the push button 60, thereby closing contact between the lever 49 and the contact pin 61, as shown in full lines in the drawings, and he further talks into the transmitter 62. Currents will now flow from the local battery 63 associated with said transmitter, over the primary 64 of the usual induction coil, and back to said battery 63. The passage of currents through the primary 64 induces currents in the secondary 65 of said induction coil, which may be considered as passing from one end of said coil over the conductor 66, through the contacts 61, over the lever 49, along the wire 48, through the contact 47, lever 46, receiver 45, over the western main line wire 44, to the point 67, armature 68 of the western controller 69, through the contact 70 of said controller, wire 71, coils of the western repeater 72 to point 54, main line wire 53, and wire 73 back to the opposite end of the secondary 65. The passage of these voice-caused currents through the western main line sending circuit just described and through the western repeater 72 will cause its contacts 95 and 96 to permit current from the local battery 97 to pass across the same, and along the wire 98 to and through the contact 76 of the western controller, along the wire 99, through the primary 100 of the western induction coil, and wire 101, back to battery 97. It will thus be seen that the western main line sending circuit is entirely independent of the local circuit of the repeater 72.

The passage of current through the primary 100 induces currents in the secondary 102 of said western induction coil, which currents pass along the eastern main line receiving wire 28 to the condenser 27, thereupon charging the same and causing similar currents to pass along the eastern main line receiving wire 10, through the eastern receiver 11, hook lever 12, contact 13, connec-

tion 14, contact lever 6, contact point 103, and into condenser 104. The charging of the condenser 104 will thereupon cause similar currents to pass along the main line wire 16, to the point 17, near the controller 19, along the main line wire 105, through contact 75 of the western controller 69, and along wire 106 to the other end of said induction coil 102. It will be observed that this eastern main line receiving circuit is also entirely independent of the western sending circuit except through the inductive relation of the local circuit from the battery 97, and that the contacts 36, 37 and 95, 96, of course represent the variable contacts of a granular, or other telephone transmitter.

It is now evident that in transmitting speech from the western to the eastern station, the only coils in circuit are the secondary coil 102 of the western induction coil, the western repeater coil and the coil of the receiver 11. In other words, it will be clear from the foregoing that my system comprises a controller in an independent circuit which so governs other circuits as to enable me to provide independent main sending and receiving circuits which include in the sending circuit of the repeating apparatus, only the coils of the repeater used, and in the main line receiving circuit only the secondary of an induction coil, and the coils of a receiver.

This case differs from my former Patent #970,288, September 13, 1910, for telephone repeaters, among other things, in that the controller of said patent is governed and actuated by voice-caused currents, while in this invention the controller is manually governed and actuated by an electric energy greater than the voice-caused current energy. This case also differs from my pending application #553,073, telephone repeating system and apparatus, among other things, in that in said application the controller is located in the main line talking circuit.

It is obvious that those skilled in the art may vary the arrangement of parts without departing from the spirit of my invention and therefore I do not wish to be limited to that shown except as may be required by the claims.

What I claim is:—

1. In a telephone repeating system, the combination of a sending circuit; a receiving

circuit independent of said sending circuit; local circuits comprising induction coils adapted to be inductively associated with each of said sending and receiving circuits at different times; a repeater in one of said local circuits governed by said sending circuit; a repeater in another of said local circuits governed by said receiving circuit when the latter is employed as a sending circuit; and controller circuits associated with and adapted to control at different times each of said sending and receiving circuits, substantially as described.

2. In a telephone repeating system, the combination of a sending circuit; a receiving circuit independent of said sending circuit; local circuits adapted to be inductively associated with each of said sending and receiving circuits at different times; controller circuits associated with and adapted to control at different times each of said sending and receiving circuits; a condenser in said sending circuit; an impedance in one of said controller circuits; and manually controlled means for closing said controller circuits, substantially as described.

3. In a telephone repeating system, the combination of a sending circuit comprising a condenser, a repeater, and a magnetically controlled contact; a controller circuit comprising a manually controlled contact; and an impedance; a local circuit controlled by said repeater comprising the primary of an induction coil; a receiving circuit in inductive relation to said primary and comprising a second contact controlled by said magnet, substantially as described.

4. In a telephone repeating system, the combination of independent sending and receiving circuits; independent controllers for governing each of said circuits at different times; local circuits adapted at different times to reproduce a current of the sending circuit in the receiving circuit and vice versa; and a relay governed by one of said controllers for energizing the other controller, substantially as described.

In testimony whereof, I affix my signature, in presence of two witnesses.

CHARLES ADAMS-RANDALL.

Witnesses:

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